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Building in Results: Challenges and Opportunities for Measuring PERD R&D

by Scott Coutts

Strategic Planning, Evaluation and Communications
Office of Energy Research and Development (OERD)



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OVERVIEW

- Energy S&T
- Program of Energy Research and Development (PERD)
- Characteristics of R&D
- Structure and Management of PERD
- Results-based Management
- Discoveries from the Evaluations
- Office of Energy Research and Development's Response

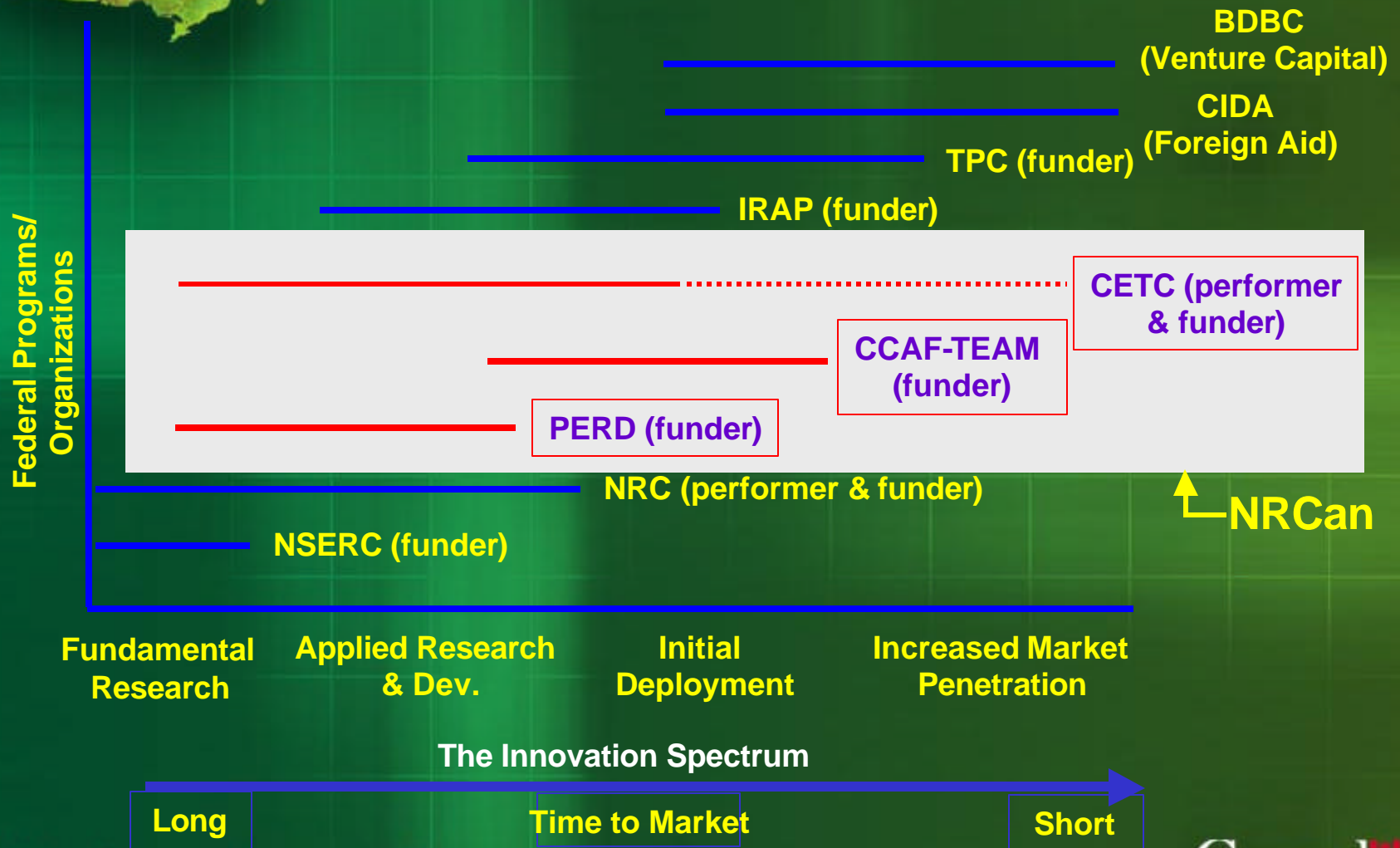
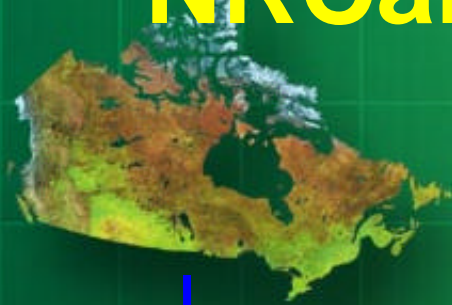


Energy S&T

- An important element of NRCan's mandate is the delivery of energy-related science and technology in support of federal priorities.
- The Program of Energy Research and Development (PERD) is the foundation program. Through strategically targeted funding, PERD supports fundamental and applied energy R&D to ensure a sustainable energy future.
- PERD is managed and performed by NRCan in partnership with OGDs, other levels of government, the private sector and academia.
- 12 federal departments and agencies participate in PERD.



NRCan in Federal Energy S&T Scene





Challenges: The Culture of the R&D Community

RBM causes concern among R&D personnel because:

- They have a long history of being activity based
- They want to conduct research and limit their involvement in management issues
- They are comfortable using an inductive approach
- They question the relevance and usefulness of RBM
- They believe that RBM influences the focus of research towards the short term, since it is easier to show results



Challenges: Characteristics of R&D

R&D is difficult to measure because:

- **Outcomes may materialize only after considerable periods of time**
- **Relationships between research and eventual outcomes are often complex and indirect**
- **Outcomes and impacts are difficult to identify in advance**
- **Knowledge gained is not always of immediate value or application**
- **Results are sometimes more serendipitous than predictable**
- **Negative determinations or findings are common**
- **R&D perform different functions and produce different outputs**
- **Due to these difficulties and differences, any measurement system has to be designed accordingly**



R&D Characteristics





OERD's Response To These Challenges

In 1999 OERD introduced a program stewardship model that integrated:

- **Planning:**
 - sustainable development is the broad policy driver
- **Performance measurement**
- **Evaluation**

The goals of this restructuring include:

- **Increased transparency and accountability,**
- **Improved program and project management,**
- **Equitable resource allocation practices, and**
- **Better energy R&D investment decision-making.**





R&D Evaluation Context

- Overall PERD = 33 POLs (start of 2003)
- A POL refers to a collective set of R&D projects designed to fulfill a higher level Strategic Objective and its respective Strategic Direction and Intent
- POL Plan is a management and accountability document that includes:
 - brief project descriptions
 - logic Model
 - performance Measurement Framework
 - reporting requirements
 - risk Assessment
 - lifespan of 4 years





R&D Evaluation Context Cont'd

- **Relevance of the POL – consistent with departmental and government wide priorities**
- **Success of the POL – outputs, outcomes**
- **Design and Delivery**
- **Alternatives to the POL – whether or not more effective alternatives exist**
- **Reach – effectiveness of the POL in obtaining support of key players**
- **Effectiveness of Results Based Management structure**
- **Case Studies: 1 per activity area to be selected by evaluation team**



R&D Evaluation Context Cont'd

- PERD program evaluations are scheduled on a four-year cycle
- Approximately $\frac{1}{4}$ of POLs evaluated each cycle
- Provide a continuous flow of information on PERD's performance and achievements





Performance Monitoring

- **Project performance is measured and reported through:**
 - the provision of detailed reports from project proponents,
 - reports on the quality and relevance of the research by external reviewers, and
 - presentation and discussion of the project results at conferences and workshops.
- **At the program level, performance is reported in the POL Annual Report**





Summary: Status of RBM Implementation

- **Cycle I and II evaluations are complete, and Cycle III is underway.**
- **With the introduction of the POL structure, RBM has become a key part of program planning and delivery.**
- **POL managers have taken a good first step towards implementing RBM.**
- **More can be done to better support RBM and improve POL reporting.**



Discoveries from Cycle I & II

Findings:

- The focus has been on measuring outputs
- Lack of understanding of logic models in R&D community
- A cookie cutter approach was used leading to logic models that do not fully reflect POL objectives
 - over simplification of the results chain
 - unrealistic outcomes, and performance indicators
- Too much focus on terminology (e.g., impacts, effects, outcomes, results)



OERD's Response to Cycle I & II

- In cycle I, groups of POLs were evaluated. This approach was abandoned due to the complexities of R&D. We now evaluate each POL individually.
- In Cycle I OERD led the evaluation process. This was like the “fox looking after the henhouse”.
- In Cycle II OERD engaged NRCan's corporate Audit and Evaluation Branch to guide the evaluation process
- Terms of References for Cycle II were modified to include evaluation issues relating to Reach and RBM
- Management responses to the evaluations' recommendations are built into future POL Plans to ensure that appropriate actions are taken.





OERD's Response to Cycle I & II cont'd

- OERD is developing materials and workshops to educate the PERD R&D community concerning the importance of RBM
- Technology transfer aspect of the program is being examined in light of findings concerning outcomes and impacts
- The focus has shifted to identifying and achieving intermediate outcomes in order to measure the degree to which the targeted community is moving towards adoption of research results





LOGIC MODELS

DILBERT

RATBERT THE CONSULTANT

YOUR STRATEGY OPTIONS
CAN BE SHOWN IN THIS
MATRIX.

SCOTT ADAMS E-MAIL: SCOTTADAMS@AOL.COM

THE FOUR BOXES
ARE "SOMETHING...
SOMETHING... SOME
OTHER THING AND
WHATEVER."

IN PHASE TWO I HOPE
TO TURN THIS MATRIX
INTO CONCENTRIC

I'M UNDER
THE CONSUL-
TANT'S
SPELL.

CIRCLES WITH
LABELS AND
ARROWS.

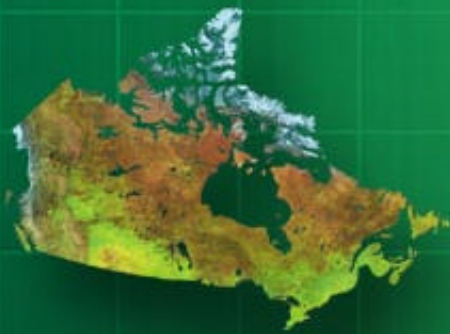
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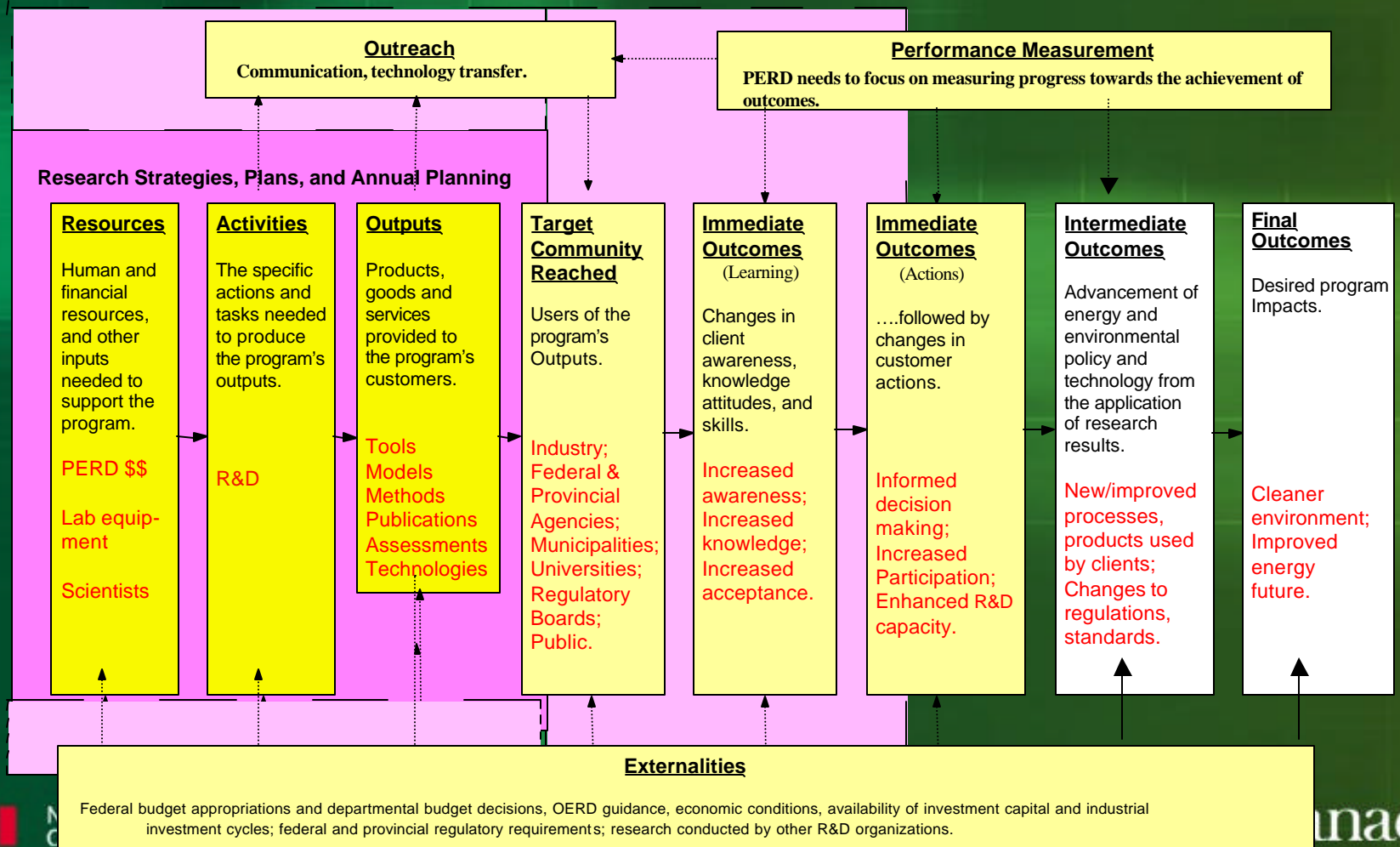
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Generic Logic Model For an Energy R&D Program





Program Logic Model for POL 1.2.1

POL

Outputs

Outcomes

Impacts





Discoveries: Logic Models

An analysis of the logic models found that:

- **They do not include the early or intermediate outcomes that bridge the gap between outputs and the more long-term outcomes described.**
- **Outcomes and impacts identified are long term and will occur beyond the timeframe of the POLs**
- **Performance indicators need to be developed that will capture early or mid-project deviations or problems that may interfere with the achievement of longer term outcomes.**

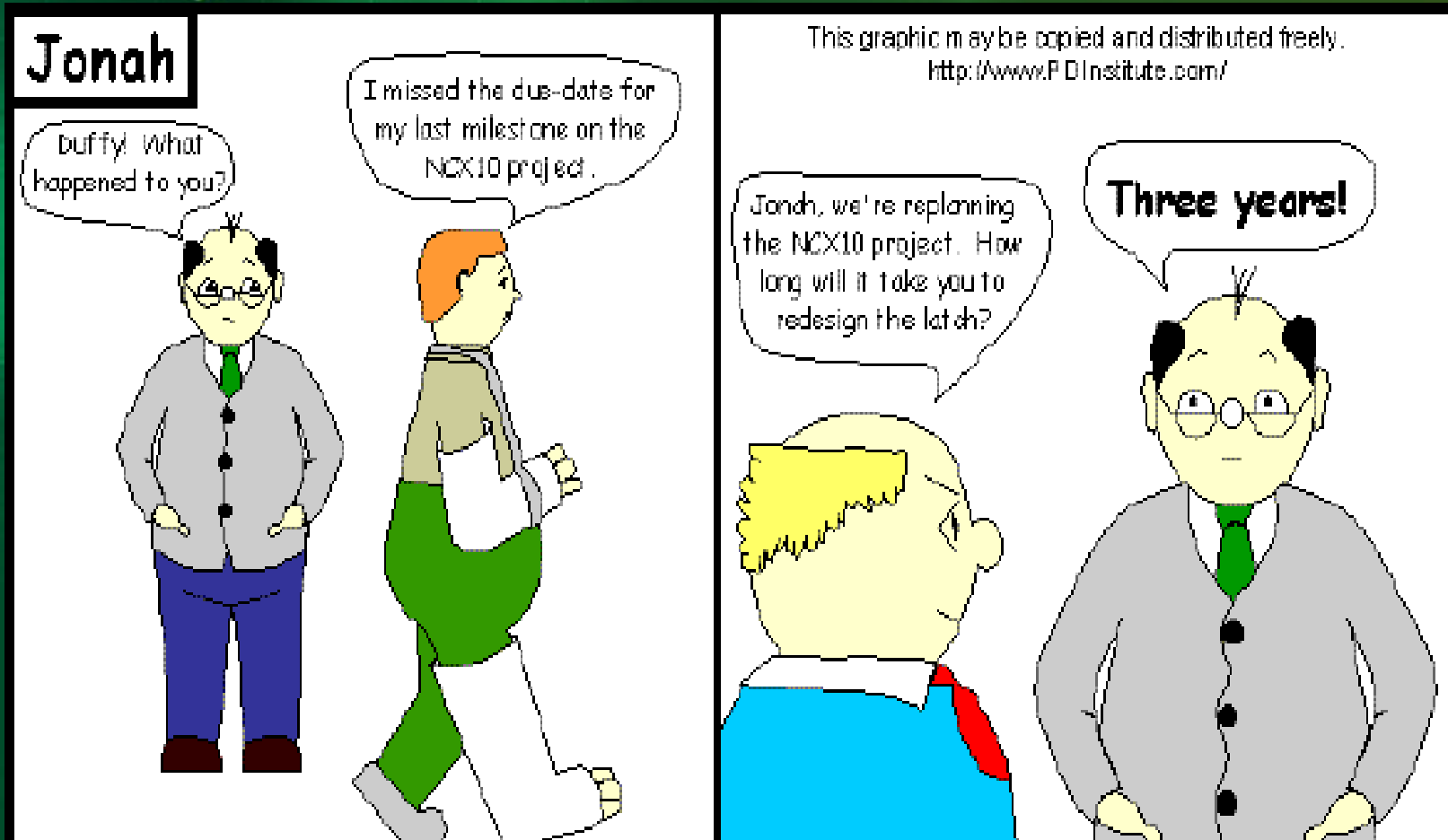


Discoveries: Logic Models Cont'd

- There are significant immediate/intermediate outcomes realized by POLs, that are not being reported. For example:
 - Increased knowledge within the POL (knowledge advancement);
 - Increased awareness within the target community (e.g., industry) about the impact that research results can have on cost of operations and energy efficiency
 - Improved technical infrastructure (e.g., standards, measurement protocols etc.)
 - Collaborative networks
- These earlier outcomes are necessary precursors to broad scale adoption of research results and longer term outcomes.



Challenges: Performance Measurement





Discoveries: Technology Transfer

- **Tech transfer: Transfer of scientific and/or technology knowledge from one group to another.**
- **Success of PERD depends on effective tech transfer so that clients can use research results to accomplish desired energy benefits.**
- **If this does not occur, the desired changes in knowledge and behaviour (immediate/intermediate outcomes) leading to improvements in energy and environmental conditions may not occur to the level desired.**



OERD's Message to the PERD Community

- **RBM and long term R&D are not contradictions**
- **RBM is not in favour of utility alone as a desirable value to be pursued by R&D**
- **RBM can also measure successes that are applicable to long term R&D such as knowledge advancement and effective collaboration.**



OERD's Message to PERD R&D Community: Attribution

The challenge of attribution:

- It is usually not possible to determine definitively the extent to which a program contributes to a particular outcome.
- It is possible to obtain considerable evidence that will increase knowledge and understanding about how and if a program is contributing to achieving outcomes and impacts.

OERD's Message to PERD R&D Community: Intermediate Outcomes



- Despite the attribution challenge, managers must be able to demonstrate that their programs are being managed for results.
- The focus should be on identifying and measuring intermediate outcomes
- Intermediate outcomes are more attributable to PERD actions.
- Intermediate outcomes are effects that are necessary for achieving final outcomes, but which may not themselves provide direct public benefit.
- Intermediate outcomes help to demonstrate the progress that the POL is making toward achieving its long term outcomes.



OERD's Message to PERD R&D Community: Intermediate Outcomes Cont'd

- **Result from the groups that are directly reached and influenced**
- **Benefit to client or impact on target group behavior**
- **Measurement can be difficult, but often feasible**
- **Range of planned performance rather than precise targets**
- **Management interest**
- **Critical success factor**



Immediate/Intermediate Outcomes

Examples:

- Better understanding of...
- Change in attitudes regarding...
- Reduced risk concerning...
- Increased participation of...
- Use of information
- Improved decision making
- Etc.



Future Challenges

POL level:

- **Continuous education of the POL community**
- **Development of realistic logic models that reflect the steps by which POLs will attain their objectives**

PERD level:

- **Evaluation of the Evaluations**
 - **value added**
 - **develop a new PERD evaluation strategy**



Conclusion

- PERD will continue to improve the quality of its R&D by informing energy R&D planning and delivery through high-quality RBM.

We believe that RBM can:

- help explain the current investment in Federal R&D activities to decision-makers and the Canadian public;
- link R&D to results that they will be likely to value;
- provide information to ensure the proper management of federal R&D.



Move Beyond the Flames to Measure Outcomes

